



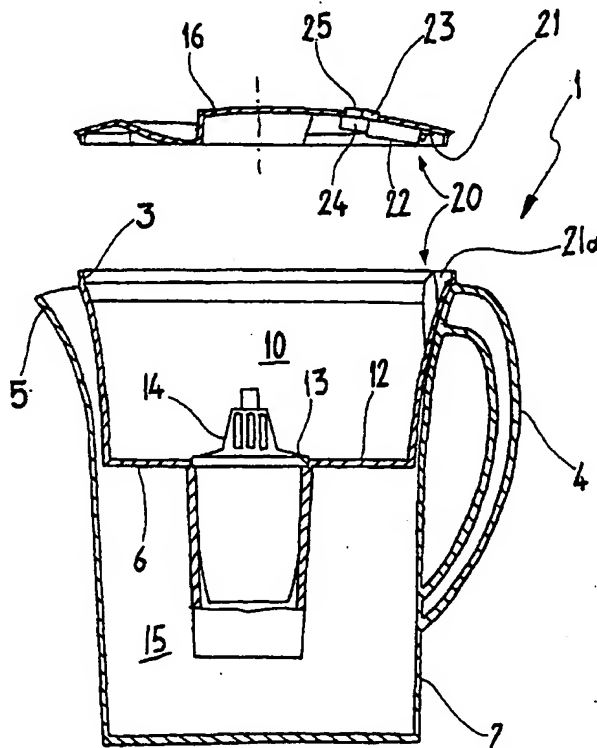
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/EP00/01687</p> <p>(22) International Filing Date: 29 February 2000 (29.02.00)</p> <p>(30) Priority Data: PD99A000089 3 May 1999 (03.05.99) IT</p> <p>(71) Applicant (for all designated States except US): LAICA S.R.L. [IT/IT]; Viale del Lavoro, 10, I-36020 Ponte di Barbarano (IT).</p> <p>(72) Inventor; and (75) Inventor/Applicant (for US only): MORETTO, Leonida [IT/IT]; Via Tormeno, 235/C, I-36100 Vicenza (IT).</p> <p>(74) Agents: CANTALUPPI, Stefano et al.; Jacobacci &amp; Perani S.p.A., Via Berchet, 9, I-35131 Padova (IT).</p>	<p>(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p>Published With international search report.</p>	

(54) Title: A FILTERING VESSEL HAVING A REPLACEABLE CARTRIDGE

## (57) Abstract

A description is given of a filtering vessel having a replaceable cartridge (14), including a reservoir (10) for collecting the fluid to be filtered, a first (3) and a second (13) open passage in the reservoir (10), respectively for the introduction of the fluid into the reservoir (10) and for the discharge of the fluid into the filtering cartridge (14), plugging means (16) for plugging the first passage (3), first counting means (20) for counting the number of opening and closing cycles of the plugging means, means signalling (23) the number of cycles counted by the counting means (20) and capable of emitting a signal indicating that the cartridge is exhausted at the end of a predetermined number of cycles, wherein there are provided second means for counting (24) the time which has elapsed since a first of the opening and closing cycles and means for signalling (25) the counted time which are capable of emitting a further signal indicating that the cartridge is exhausted at the end of a predetermined time, the signalling means (25) being associated with one another in such a manner that the exhaustion of the cartridge (14) is signalled by the first of the signals emitted.



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## A FILTERING VESSEL HAVING A REPLACEABLE CARTRIDGE

Technical Field

The present invention relates to a filtering vessel having a replaceable cartridge, of the type including the  
5 characteristics mentioned in the preamble of the main claim.

Background art

Filtering vessels of the above-mentioned type are known, for example, from the patents US 5,190,643, GB 2,288,529 and WO 96/13318.

10 The first two documents mentioned describe filtering vessels in which the passage for filling the collecting reservoir is formed in a removable lid which closes the reservoir. The plugging means comprise a guillotine-type plugging member which is associated with the lid and the  
15 movement of which, during the opening and closing cycles, is detected by a mechanical sensor which, by means of a likewise mechanical display device, enables the number of reservoir-filling cycles and the consequent degree of use of the cartridge to be displayed.

20 The third document, however, illustrates a vessel in which the passage for filling the collecting reservoir is defined by the mouth of the reservoir and the plugging means are constituted by a removable lid which is fitted to close the vessel. In this case too, counting means for detecting  
25 the number of opening and closing cycles of the lid and mechanical display means for showing the degree of use of the cartridge are provided.

Both of those types of known vessel promote the replacement of the filtering cartridge at the end of a  
30 predetermined number of cycles showing that the cartridge has been exhausted.

However, it should be considered that the filtering material contained in the cartridge, once wetted on first use, is subject to slow deterioration which is substantially independent of subsequent use and which is such as to  
5 produce a slow but gradual exhaustion of the cartridge even by ageing alone.

The deterioration of the cartridge by ageing is not detected by conventional filtering vessels.

#### Disclosure of the Invention

10 The problem underlying the present invention is to provide a filtering vessel which is configured structurally and functionally to avoid the disadvantages discussed with reference to the mentioned prior art.

The problem is solved by the invention by means of a  
15 filtering vessel produced in accordance with the claims which follow.

#### Brief description of the drawings

The characteristics and advantages of the invention will become clearer from the detailed description of some  
20 embodiments thereof illustrated by way of non-limiting example with reference hereinafter to the appended drawings in which:

- Figure 1 is a partly sectioned side view of a vessel according to the invention,
- 25 - Figures 2 and 3 are partly sectioned perspective views of a detail of the vessel of Figure 1 in two respective variants.

#### Best mode of carrying out the invention

In Figure 1, a filtering vessel produced in accordance  
30 with the present invention is generally indicated 1.

Although the vessel 1 is in the form of a jug or carafe for making water drinkable and purifying it, it will be appreciated that the invention can also be usefully applied in other sectors in which it is necessary to filter liquids and drinks, such as, for example, in the preventive filtering of water supplied to machines for the preparation of infusions and coffee.

The vessel 1 can be seen to accommodate an external container 2, which is open at the top at the location of a mouth 3 and which is provided with a handle 4 and with a spout 5, as well as an internal container 6, which is accommodated in the container 2 and which defines a reservoir 10 for collecting the fluid to be filtered.

The reservoir 10 is likewise open at the top and is in a hopper-like form with a base 12 in which a second passage 13 is open. A filtering cartridge 14, for example of the activated carbon type, is removably arranged in the passage 13 in a manner known per se, so that the liquid introduced into the collecting reservoir 10 is filtered by the cartridge 14 and received in a lower reservoir 15 for collecting the filtered fluid.

A removable lid 16 closes the container 2 and the reservoir 10. The lid 16 may or may not have one or more openings. In the embodiment of the invention described with specific reference to Figure 1, the mouth 3 is also indicated, with reference to the claims which follow, as a first passage for the introduction of the fluid to be filtered into the reservoir 10 and the lid 16 constitutes a plugging means for plugging that first passage. This indication results from the fact that, in the absence of other openings, the lid has to be removed from the vessel in

order to introduce the water to be filtered and then has to be put back on again to prevent the ingress of dust and foreign bodies. First counting means 20 are mounted on the lid 16 and on the container 2 for counting the number of opening and closing cycles of the lid 16 (plugging means). Those first counting means are, for example, constituted by a switch 21 which is mounted on the lid 16 and operated by a rib or projection 21a at the mouth 3 of the container 2 in order to generate an electrical pulse at each opening and closing cycle of the lid and which switch 21 is associated with an electronic counting circuit 22 which is known per se and which is capable of adding up the number of electrical pulses generated by the switch.

Means signalling the number of cycles counted by the counting means are also arranged on the lid 16, for example in the form of an electronic digital or symbolic display 23 which is capable of displaying the increases or decreases in the count effected by the circuit 22 and, at the end of a predetermined number of cycles, of emitting a signal indicating that the cartridge is exhausted.

According to the invention, the vessel 1 also comprises second means 24 for counting the time that has elapsed since a first opening and closing cycle of the lid 16, or since the first operating cycle of the cartridge 14.

The counting means 24 are of a type known per se and comprise a time-counting circuit, otherwise referred to in this context as an electronic clock, which is integrated in the counting circuit 22. Signalling means 25, for example constituted by the same electronic display 23, are likewise provided and are capable of showing the time counted and of emitting a further signal indicating that the cartridge is

exhausted at the end of a predetermined time, which is equal to the average degradation time of the filtering material of the cartridge once wetted. The signalling means 23, 25 are associated with one another in such a manner that the  
5 exhaustion of the cartridge is signalled by the first of the emitted signals, respectively owing to the exhaustion of the number of filtering cycles allowed for the cartridge, or owing to the elapse of the useful life limit time of the cartridge starting from the first operating cycle carried  
10 out.

In the examples of Figures 2 and 3, the first passage is formed as a through-hole 29 in the lid and the plugging means are constituted by a plugging member in the form of a rotatable shutter 30 (Figure 2) or in the form of a  
15 guillotine 31 guided on tracks 32 (Figure 3) formed on the lid 16. In the first case, a hand-grip 33 is provided which is associated with the shutter 30 in order to rotate it towards an open state in which the passage 29 is not plugged (preferably the return to a closed state is urged by a  
20 spring). In the second case, a projection 34 is provided for sliding the guillotine 31 towards the open state, in this case too against the action of a spring 35.

In all cases, a sensor, which is indicated diagrammatically by 40 and which is associated with the  
25 plugging means in the form of a shutter 30 or in the form of a guillotine 31, is provided in order, like the switch 21, to generate a signal at each opening and closing cycle of the vessel. The same electronic display 23 as used in the preceding example is used as the signal display device for  
30 displaying the number of cycles counted and/or the cartridge-exhaustion signal linked with the number of cycles

and with the time passed since the first operating cycle of the cartridge. In this case too, the second counter is preferably integrated in the first counter.

The invention thus solves the problem posed using means  
5 which are both simple and efficient. It will be appreciated that the sensors used may be means other than those described by way of example but functionally equivalent thereto, for example proximity sensors, switches with magnets, piezoelectric elastomers or other means capable of  
10 generating a signal at each opening and closing cycle of the plugging means. Finally, it will be appreciated that the signal that indicates that the cartridge is exhausted and that is in its turn generated by the signalling means may be  
15 of a different type, for example acoustic, optical or combinations of the two.



## CLAIMS

1. A filtering vessel having a replaceable cartridge (14), including:
- a reservoir (10) for collecting the fluid to be filtered,
  - 5 - a first (3) and a second (13) open passage in the reservoir (10), respectively for the introduction of the fluid into the reservoir (10) and for the discharge of the fluid into the filtering cartridge (14),
  - plugging means (16) for plugging the first passage (3),
  - 10 - first counting means (20) for counting the number of opening and closing cycles of the plugging means (16),
  - means signalling (23) the number of cycles counted by the counting means (20) and capable of emitting a signal indicating that the cartridge (14) is exhausted at the end
  - 15 of a predetermined number of cycles,
- characterized in that it comprises:
- second means for counting (24) the time which has elapsed since a first cycle and
  - means for signalling (25) the counted time, which are
  - 20 capable of emitting a further signal indicating that the cartridge is exhausted at the end of a predetermined time, the signalling means (25) being associated with one another in such a manner that the exhaustion of the cartridge (14) is signalled by the first of the signals emitted.
- 25 2. A vessel according to claim 1, wherein the reservoir (10) is closed by a removable lid (16).
3. A vessel according to claim 2, wherein the first passage is formed at a mouth (3) of the reservoir (10) and the plugging means are constituted by the lid (16).

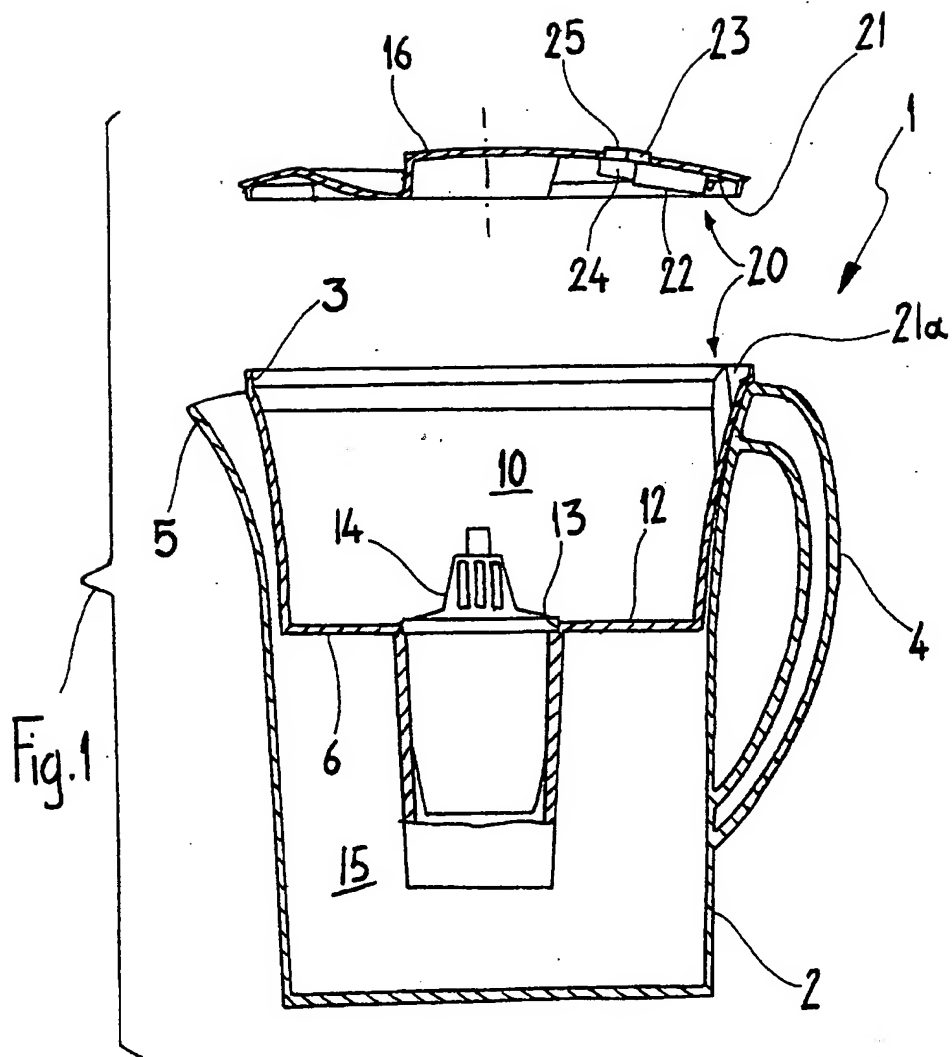
4. A vessel according to claim 2, wherein the first passage is formed in the lid (16) and the plugging means are mounted on the lid (16).

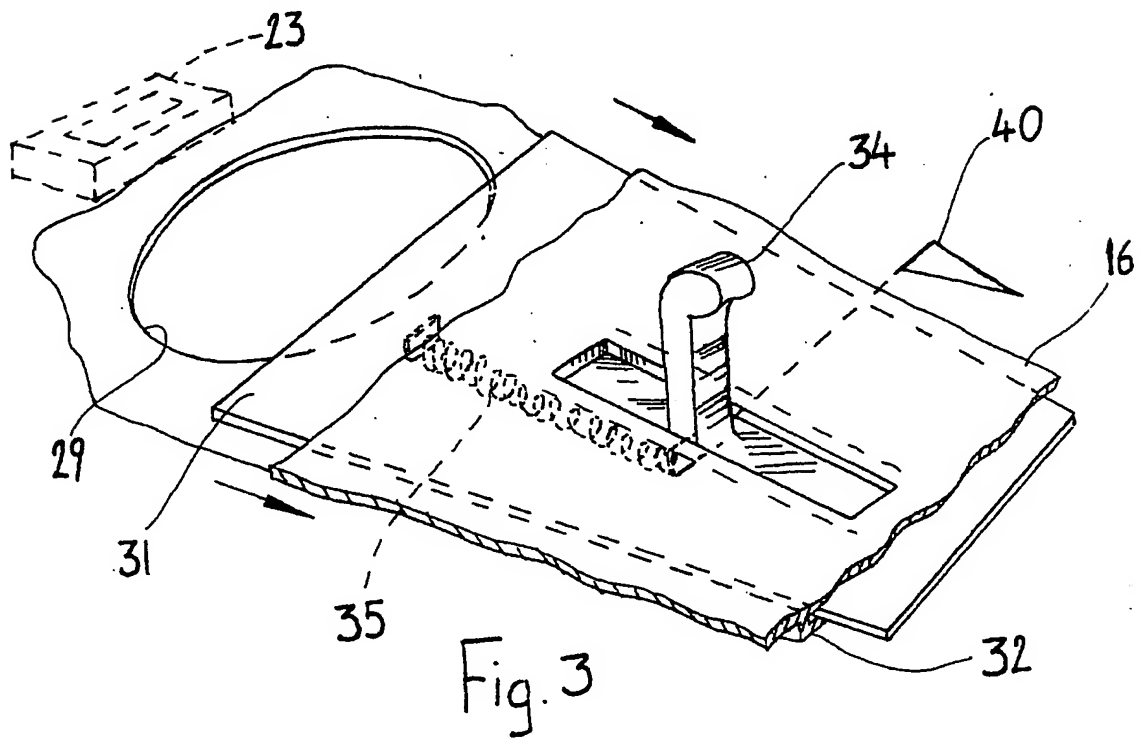
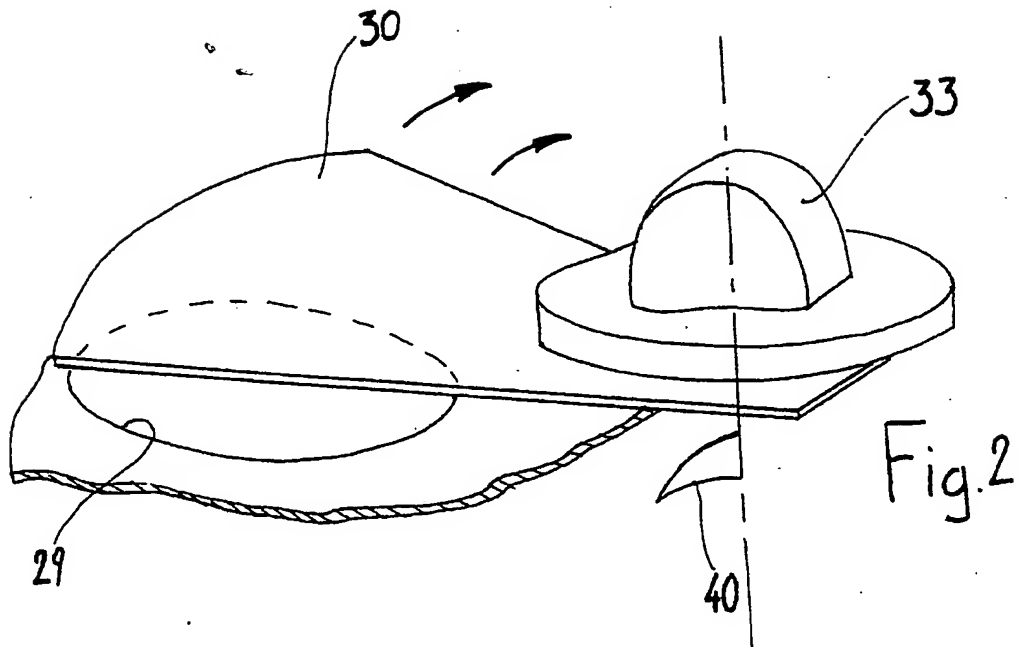
5. A vessel according to one or more of the preceding  
5 claims, wherein the first counting means (20) comprise a sensor (40) associated with the plugging means for generating a signal at each opening and closing cycle of the plugging means and the signalling means comprise a display device (23) associated with the sensor (40) for displaying  
10 the number of cycles counted and/or the signal indicating that the cartridge is exhausted.

6. A vessel according to claim 5, wherein the sensor (40) is of the type capable of generating an electrical signal and the display device (23) is of the electronic type.

15 7. A filtering vessel according to one or more of the preceding claims, wherein the second counting means (24) comprise an electronic clock.

8. A filtering vessel according to one or more of the preceding claims, wherein the signalling means (25) comprise  
20 a single display device (23) of the electronic type controlled by both of the first and second counting means (20, 24).





# INTERNATIONAL SEARCH REPORT

Int'l. Application No

PCT/EP 00/01687

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 B01D35/143 C02F1/00

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B01D C02F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 891 952 A (BRITA WASSERFILTER) 20 January 1999 (1999-01-20) the whole document	1-8
A	GB 2 257 429 A (KENWOOD MARKS LTD) 13 January 1993 (1993-01-13) page 7, line 1 -page 8, line 13; claims 1-4	1-4
A	GB 2 288 529 A (KENWOOD MARKS LTD) 25 October 1995 (1995-10-25) cited in the application figures 1-4	1-4
A	DE 298 11 074 U (BRITA WASSER-FILTER) 19 November 1998 (1998-11-19) page 7, paragraph 3 -page 8, paragraph 4; figures 4-11	1-8

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Information on patent family members

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